

# Construction Advisory

CA 2007-13  
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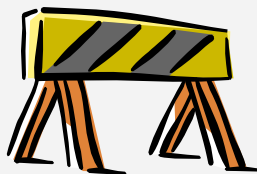
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Construction Advisory  
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BJO:DMG

## Riprap Placement for Storm Water Drainage

The purpose of this construction advisory is to emphasize construction details for riprap placement at those locations intended to carry storm water and provide protection against soil erosion and subsequent sedimentation. This construction advisory specifically addresses ditches, channels, spillways and storm water outfalls. For these applications, the primary purpose of riprap is to dissipate energy from the storm water runoff to a non-erosive velocity to minimize erosion.

To achieve effective performance of the riprap, the important elements to monitor are geotextile liner installation, stone size, type and placement, and proposed channel configuration, both in cross section and plan view. Perform this work in accordance with Sections 814 and 916 of the *2003 Standard Specifications for Construction*. Riprap may be comprised of natural stone or broken concrete that is free of soil, HMA or

protruding reinforcing steel. HMA and brick are not permitted for use as riprap. One of the most common causes of riprap failure is inadequate stone size. The footprint dimensions for plain riprap should range from 8 to 16 inches, with an in-place thickness of at least 8 inches.

Prior to riprap placement, prepare the base to finish grade and place geotextile liner as detailed in Section 814 of the *2003 Standard Specifications for Construction*. Geotextile liner that meets the physical requirements specified in Table 910-1 of the standard specifications shall underlie all areas where riprap will be placed. By specification, geotextile liner is made from non-woven geotextile. Woven geotextile, like that used for silt fence, should never be used for riprap applications. All seams, if not sewn, should overlap a minimum of 2 feet. At

outlets, place the geotextile liner prior to the end section and extend it a minimum of 2 feet upslope from the end of the proposed outlet end section. When heavy riprap is specified, the pay item Geotextile Liner, Heavy is required.

Channel configuration is critical for effective performance of the riprap. In accordance with Standard Plan R-46-C, the ditch, channel or spillway should have a concave configuration (not flat) with the center being a minimum of 6 inches below the outer limits of the riprap placement. The steeper the slope angle, the greater the depth of the channel should be to ensure that the runoff is contained. On long steep channels, stone check dams may be constructed to reduce velocity of the flow.

Riprap placement at outfall end sections should be in accordance with E&S-7-A of the *Soil*

*Erosion and Sedimentation Control Manual*. There are generally two variations for riprap placement at outfall end sections; the pipe will outlet to a defined channel or to a flat area. If the outlet is to a channel, the configuration should be as described above in accordance with R-46-C. If the outlet is to a flat area, place the riprap in a configuration that fans out beyond the limits of the flared portion of the end section. In situations where high volumes of water are

anticipated, the stone may be bermed up in a semicircle pattern beyond the end section to create a stilling pool to reduce velocity of the storm water. The area limits of the riprap for this application are situation dependent and will need to be adjusted in the field on a case-by-case basis.

For additional information and details refer to the following MDOT documents:

- *2003 Standard Specifications for Construction*, Sections 813, 814, 910 and 916
- *Soil Erosion and Sedimentation Control Manual*/E&S-7-A
- Standard Plan R-46-C
- *Construction Manual*, Section 813
- *Drainage Manual* Chapter 9

Please share this information with consultants and local agencies within your area.